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## TRIGONOCARPUS EXCRESCENS JANSSEN, 1940, A SUPPOSED SEED FROM THE PENNSYLVANIAN OF ILLINOIS, IS A MILLIPED (DIPLOPODA: EUPHOBERIIDAE)

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### ABSTRACT

The syntype specimens of *Trigonocarpus excrescens* Janssen, 1940, do not belong to the form genus *Trigonocarpus* Brongniart, 1828, but are composed of body segments of euphoberiid millipeds. Some other specimens described as plants by Janssen also may be fossil arthropod parts.

### Introduction

Fossil myriapods have been confused with other types of organisms, including annelid worms, onychophorans, arachnids, crustaceans, and ferns (see Hannibal, 2001, for examples and citations). Such misidentifications are due to the superficial resemblance of whole or partial myriapod fossils to fossils of other organisms, and vice versa. The purpose of this note is to redescribe and discuss the syntype specimens of *Trigonocarpus excrescens* Janssen, 1940. These supposed plant specimens are composed of body segments of euphoberiid millipeds.

Specimens referred to are in the collections of the Illinois State Museum (ISM), The Cleveland Museum of Natural History (CMNH), the Field Museum of Natural History (FMNH), and the Yale Peabody Museum (YPM). Terminology follows Burke (1979) and Hannibal (1995, 1997a).

### Systematic Paleontology

Class DIPLOPODA Blainville in Gervais, 1844

Subclass HELMINTHOMORPHA Pocock, 1887

Order EUPHOBERIIDA Hoffman, 1969

Family EUPHOBERIIDAE Scudder, 1882

Genus MYRIACANTHERPESTES Burke, 1979

*MYRIACANTHERPESTES EXCRESCENS* (Janssen), new combination

Figures 1-2

*Trigonocarpus excrescens* JANSSEN, 1940, p. 100-101, Pl. 28, figs. 3-4; LANGFORD, 1958, p. 312, figs. 584, 585; LEARY, 1976, p. 58-59; GASTALDO AND MATTEN, 1978, table 2 (p. 887).

### Material

Cotypes (syntypes). ISM 14764a/b (14764b is illustrated in Figure 1A and in Janssen 1940, Pl. 28, fig. 3; a latex cast of 14764a is illustrated in Figure 2A) and ISM 14765a/b (14765a is illustrated in Figure 1B and in Janssen, 1940, Pl. 28, fig. 4; a latex cast of 14765b is illustrated in Figure 2B). Both specimens are from a strip mine in Will Co., Illinois. They are preserved in typical Mazon-Creek type siderite concretions ("ironstone nodules"), in part and counterpart, from the Francis Creek Shale Member (Pennsylvanian, Westphalian D) of the Carbondale Formation. These were the only specimens known to Janssen at the time he wrote his 1940 paper. Latex casts were made from prepared natural molds of the specimens (see Hannibal "2000," p. 23–24, for details).

### Diagnosis

Large euphoberiid millipeds with relatively long lateral spines having prominent, curved anterior prongs; long, simple, stout, diverging paramedian spines; and anterior and posterior spinelets.

### Description of Specimens

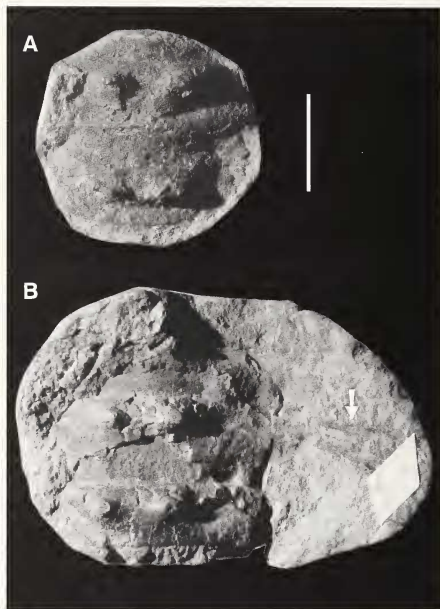
Portions of large euphoberiids in dorsal view. Composed of two to three body segments. Width of segments, excluding lateral spines, up to about 23 mm. Prozonites and metazonites distinct. Paramedian spines long, stout, outwardly directed and gently diverging.

ISM 14765a/b, larger and more complete specimen (Figures 1B, 2B), 22 mm long, consisting of portions of three body segments; prozonite and metazonite of two body segments present, only metazonite of third segment present. Width of best preserved segment 23 mm; length of best preserved metazonite 6.7 mm. Body segments overlap. Prominent paramedian spines, up to about 5.4 mm long (as determined from latex of counterpart, Figure 2B), simple, stout, diverging, and borne on stout anterior ridge of metazonite. Lateral tubercle (bearing ozopore?) present. Lateral spine stout, curved towards posterior, 16.8 mm long, 3.5 mm wide just before base of anterior prong originates. Anterior prong of lateral spine stout, curved, 6.5 mm long. Posterior prong 8.4 mm long. Anterior spinelet poorly preserved, curved posteriad, 5.2 mm long. Posterior prong slightly curved, 5.0 mm long.

Less complete specimen, ISM 14764a/b (Figures 1A, 2A), 18.7 mm long, consisting of two segments; prozonite and metazonite of one segment present; most of other preserved segment consisting of metazonite. Width of best preserved segment 18 mm; length of anterior metazonite about 9 mm measured along midline. Body segments overlap. Prominent paramedian spines, > 3.6 mm long, simple, stout, gently and outwardly curving, and borne on stout anterior ridge of metazonite.

### Remarks

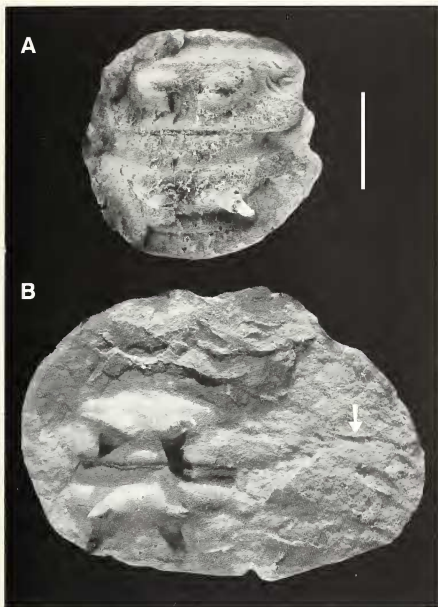
The two specimens are similar in size and both bear similar paramedian spines. The spines appear to be of different lengths (Figure 2) as ISM 14765b (a natural mold) was more



**Figure 1.** *Myriacanthepestes excrescens* (Janssen, 1940), unwhitened syntypes preserved in concretions. A, ISM 14764b; B, ISM 14765a (paramedian spines appear as nodules; arrow points to lateral spine). Scale bar equals 1 cm.

completely prepared before latex casts were made. The latex casts of the paramedian spines are also somewhat distorted. The natural mold of ISM 14764 was not prepared as completely, as the material infilling the spines of this specimen was much denser than that filling the natural mold of ISM 14765. The paramedian spine on bottom right of specimen (Figure 2A) is more indicative of spine length as its mold was more easily prepared than the mold of the other spines.

Long lateral spines, one of which is seen on ISM 14765a/b (Figures 1B and 2B), and which can be seen in Janssen's figure (1940, Pl. 28, fig. 4), are diagnostic of the genus *Myriacanthepestes*, as is the presence of an anterior spinelet. Burke (1979, p. 1) referred five species to the genus *Myriacanthepestes*: *M. ferox* (Salter, 1863), *M. hystricosus* (Scudder, 1890a) (see also Scudder 1890b), *M. inequalis* (Scudder, 1890a) (see also Scudder 1890b), *M. clarkorum* (Burke, 1973); and *M. bradebirski* Burke, 1979. Burke (1979) provided diagnoses for two of these, *M. ferox* (p. 5–6) and *M. bradebirski* (p. 12), and supplied restorations of the diplosomites of *M. ferox* and *M. hystricosus*. The very long,



**Figure 2.** *Myriacanthepestes excrescens* (Janssen, 1940), latex casts of natural molds of the syntypes. A, latex cast of ISM 14764a (paramedian spine on bottom right is more indicative of spine length); B, latex cast of ISM 14765b (shadows cast by paramedian spines indicate their long length; arrow points to lateral spine). Scale bar equals 1 cm.

diverging, paramedian spines ("subdorsals" of Burke, 1979) of the specimens are closer to those of *M. ferox* (Burke, 1979, fig. 4), but they are shorter and less curved than those of *M. hystricosus* (Burke, 1979, fig. 1). However, the anterior or prong of the lateral spine is more like that of *M. hystricosus* (Hannibal, 1997, Fig. 13.10) and not like that of *M. ferox* as diagnosed by Burke (1979, p. 5–7, fig. 4). The lateral spines of *M. excrescens* are much like those of *M. clarkorum*, but, according to Burke's (1973, p.1, fig. 1) diagnosis, *M. clarkorum* has paramedian spines ("subdorsals") reduced to nodes. It is possible, however, that the nodelike nature of the paramedian spines of *M. clarkorum* is preservational in nature. *Myriacanthepestes bradebirski* is a small species with a rounded, tapering lateral spine (Burke, 1979, p. 12–13). The lectotype of *M. inequalis* (Scudder, 1890a, Pl. 33, fig. 2) established by Burke (1979, p. 5), has very elongate, and rather slender, lateral spines, but its paramedian spines have not been described.

It is likely that *M. excrescens* will eventually prove to be a synonym of one of the already described euphoberiid species. The lack of a complete suite of preserved characters for the specimens referred to *M. excrescens*, and the incomplete nature of some of the descriptions of other species in the genus, make this a difficult task. A systematic revision of the genus *Myriacanthepestes*, and other euphoberiid genera, is needed.

Janssen (1940) misinterpreted the milliped segments of ISM 14764 and 14765 as valves of seeds in the genus *Trigonocarpus* Brongniart, 1828, which they do superficially resemble (see especially Figure 1A). The transverse ridges of the milliped segments vaguely resemble the longitudinal "ribs" and ridges of species of these seeds (see, for example, specimens figured in Hoskins and Cross, 1946). Their "oval" aspect is due to the slightly askew way that milliped segments may overlap. Janssen (1940) misinterpreted the paramedian spines on the metazonites as tubercles or spinelike excrescences. Langford's reconstruction of *T. excrescens* (1958, fig. 584, 4a), based on Janssen's interpretation, is erroneous, combining what are really three milliped body segments into a *Trigonocarpus*-like shape. The paired sets of nodes shown in his reconstruction, and seen on the specimens, are actually bases of paramedian spines. This is most clearly shown in latex casts (Figure 2).

Partially disarticulated euphoberiid exoskeletons have long been known (see, for example, Scudder, 1890, Pl. 25, figs. 1, 3). Concretions containing a small number of segments of euphoberiids are not uncommon, and examples can be found in most large museum collections of Mazon Creek concretions. The presence of two or three euphoberiid body segments in a concretion is merely part of a preservational continuum, with various numbers of preserved body segments found in concretions. Examples of euphoberiid fossils consisting of only a few segments in concretions include: FMNH PE 28724, consisting of a single euphoberiid segment; FMNH PE 16443, consisting of two segments; FMNH PE 25134, consisting of three segments; and CMNH 9190, consisting of parts of five segments. Segments may be articulated, or separate. YPM 9917, for example, consists of three euphoberiid body sections in a single concretion, one segment of which is separated from the others, and the other two (one of these a partial segment) are joined.

The other type specimens illustrated in Janssen's (1940) Pl. 28 and referred to *Carpolithus noëi* Janssen and, especially, to *Schopfia* Janssen, may also be misidentified; they may not be plants. At least some of the figured specimens of *Schopfia* Janssen, 1940, but especially ISM 14768 (Pl. 28, fig. 6) and ISM 14769 (Pl. 28, fig. 7) (see also Langford, 1958, figs. 664–668), as well as material Langford referred to as "seed attachments" (1958, p. 344, figs. 669–674) bear a resemblance to limb or other body parts of large Arthropoda such as *Arthropleura* (which is known from the Mazon Creek fauna). Langford (1958, p. 344) noted the lack of veins on specimens of *Schopfia*; indeed, specimens

referred to that genus lack definitive plant characters. The holotype of *S. calceola* Janssen (ISM 14769) resembles parts associated with *Arthropleura* (compare *S. calceola*, Janssen, Pl. 28, fig. 7 to the *Arthropleura* material figured in Hannibal, 1997b, fig. 5). While some or all of the specimens referred to *C. noëi* and *Schopfia* may well be arthropodan, they are not parts of euphoberiid diplopods.

#### Acknowledgments

One of us (SLM) first discovered that these specimens were, in fact, euphoberiids, and J. Almond, then with Cambridge University, first recognized that ISM 14765 belonged to the genus *Myriacanthepestes*. Access to type material and other aid was provided by R. Leary and J. Saunders, Illinois State Museum. Access to additional material was provided by R. White, Yale Peabody Museum, and G. Buckley and S. Lidgard, Field Museum of Natural History. Photographs of latex casts were taken and printed by B. Frumker and G. Petusky, The Cleveland Museum of Natural History. Photographs of the specimens were provided by G. Andrashko, Illinois State Museum. This article was improved by the comments of Richard Hoffman, Virginia Museum of Natural History, and an anonymous reviewer.

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